

2014 - 2015 Summer Assignment Solutions

Part 1: Prerequisite Skills

Exponent Rules:

1. $\frac{y^2}{x^6}$ 2. $-\frac{4m^7y^2}{3}$ 3. $576a^{11}c^{14}$ 4. $\frac{125a^{21}}{8b^{15}c^3}$ 5. $\frac{1}{7n}$ 6. $\frac{15}{x^{13}y^3}$

Quadratic Formula and Factoring:

1. $x = 1.5, x = 1$	7. $x = \frac{1 \pm 2\sqrt{3}}{3}$	12. $n = -2, n = -\frac{5}{2}$
2. $x = 3, x = -2.5$		
3. $x = 2, x = -1.5$	8. $x = \frac{1 \pm \sqrt{129}}{8}$	13. $k = 8, k = 3$
4. $x = \frac{1 \pm \sqrt{37}}{4}$	9. $n = \frac{2}{3}, n = -\frac{1}{4}$	14. $n = -6, n = -3$
5. $x = \frac{1 \pm i\sqrt{359}}{20}$	10. $m = 0, m = 3$	15. $v = -6, v = 1$
6. $x = 5, x = 4$	11. $n = \frac{1}{5}, n = -1$	16. $k = -2, (\text{double root})$
		17. $v = 3, v = 4$

Polynomials:

18. $x = \pm i\sqrt{5}, x = 2$	21. $x = \pm\sqrt{5}, x = \frac{7}{2}$	23. $x = \pm 1, x = \pm i$
19. $x = \pm i, x = \pm \frac{3i}{2}$	22. $x = \pm 3i, x = \frac{1}{3}, x = -2$	24. $x = \pm 3i, x = 4, x = -7$
20. $x = \pm i\sqrt{2}, x = -3$		

Part 2: Domain, Functions and Inverses

- | | |
|-------------------------------------|--------------------------------------|
| 1. all reals | 8. $x \geq 2$ |
| 2. all reals | 9. $x > 5$ |
| 3. all reals, $x \neq 3$ | 10. all reals, $x \neq 3$ |
| 4. all reals, $x \neq -4$ | 11. all reals, $x \neq 0, x \neq -4$ |
| 5. all reals, $t \neq 0, t \neq -2$ | 12. $-3 < x < 3$ |
| 6. all reals, $x \neq 6, x \neq 10$ | 13. all reals, $x \neq 10$ |
| 7. all reals, $x \neq \pm 2$ | 14. $x \leq 8, x \neq 0$ |

15. $(f+g)(x) = \frac{1+7x-x^2}{x}$, $(f-g)(x) = \frac{1-7x+x^2}{x}$, $(f \cdot g)(x) = \frac{7-x}{x}$,
 $(f \div g)(x) = \frac{1}{x(7-x)}$
16. $(f+g)(x) = \frac{1}{3x-2}$, $(f-g)(x) = \frac{9x-6}{(2-3x)(3x-2)}$, $(f \cdot g)(x) = \frac{2}{(2-3x)(3x-2)}$,
 $(f \div g)(x) = \frac{3x-2}{4-6x}$
17. $(f+g)(x) = \frac{13x+5}{6}$, $(f-g)(x) = \frac{5x+25}{6}$, $(f \cdot g)(x) = \frac{6x^2-5x-25}{6}$,
 $(f \div g)(x) = \frac{9x+15}{4x-10}$
18. $(f \circ g)(x) = \frac{1}{x^6}$, D: all reals, $x \neq 0$
19. $(f \circ g)(x) = \frac{1}{5-x}$, D: all reals, $x \neq 4$, $x \neq 5$
20. $(f \circ g)(x) = \frac{3}{3-2x}$, D: all reals, $x \neq 0$, $x \neq \frac{3}{2}$
21. $(f \circ g)(x) = x-16$, D: all reals, $x \geq 0$
22. $f^{-1}(x) = \sqrt[3]{x}$
23. $h^{-1}(x) = \frac{1}{x}$
24. $w^{-1}(x) = \frac{x-1}{2}$
25. $g^{-1}(x) = \sqrt{x-1}$
26. $r^{-1}(x) = \frac{x^5-1}{2}$
27. Yes
28. Yes
29. Yes
30. No

Part 3: Logarithmic Functions

- | | | |
|-------------------|------------------------|------------------------|
| 1. 0 | 8. $x = \frac{1}{8}$ | 14. $x = \frac{7}{2}$ |
| 2. -2 | | |
| 3. -0.5 | 9. $x = \frac{1}{100}$ | 15. $x = \frac{2}{15}$ |
| 4. 1.5 | 10. $x = 241$ | 16. $x = 100$ |
| 5. $\frac{7}{2}$ | 11. $x = 108.5$ | 17. $x = 2$ |
| 6. $-\frac{1}{3}$ | 12. $x = 0.25$ | 18. $x = 2$ |
| | 13. $x = 9$ | 19. $x = -7$ |
| 7. $x = 27$ | | 20. no solution |

$$21. x = 1$$

$$22. x = -2$$

$$23. x = \frac{23}{9}$$

$$24. x = \frac{200}{43}$$

$$25. x = \frac{4}{7}$$

$$26. x = 0$$

$$27. x = 101$$

$$28. x = 6$$

$$29. x = 3$$

$$30. x = -4, x = 4$$

Part 4: Trigonometry, Law of Sines, and Law of Cosines

$$\sin \theta = \frac{15}{17}$$

$$1. \cos \theta = \frac{8}{17}$$

$$\tan \theta = \frac{15}{8}$$

$$\sin \theta = \frac{5}{11}$$

$$2. \cos \theta = \frac{4\sqrt{6}}{11}$$

$$\tan \theta = \frac{5\sqrt{6}}{24}$$

$$\sin \theta = \frac{1}{2}$$

$$3. \cos \theta = \frac{\sqrt{3}}{2}$$

$$\tan \theta = \frac{\sqrt{3}}{3}$$

$$4. x = 4$$

$$5. x = 10.9$$

$$6. x = 14.8$$

$$7. x = 37.1^\circ$$

$$8. x = 48^\circ$$

$$9. x = 27^\circ$$

$$10. B = 55^\circ, b = 17.1, c = 20.9$$

$$11. A = 19^\circ, a = 8.5, c = 26.4$$

$$12. A = 54^\circ, a = 6.5, b = 4.7$$

$$13. B = 60^\circ, c = 8.1, A = 30^\circ$$

$$14. B = 73^\circ, b = 3.1, a = 0.9$$

$$15. a = 79.5, B = 33^\circ, A = 57^\circ$$

$$16. A = 52^\circ, b = 100.2, c = 90.4$$

$$17. b = 8.9, A = 74^\circ, a = 10.2$$

$$18. a = 36.9, C = 71.4^\circ, B = 57.6^\circ$$

$$19. b = 21, A = 52.2^\circ, C = 108.8^\circ$$

$$20. A = 48^\circ, b = 10, c = 5\sqrt{5}$$

$$21. A = 13.29^\circ, B = 53.58^\circ, C = 113.13^\circ$$

$$22. A = 47^\circ, C = 63^\circ, c = 8.5$$

$$23. a = 13.3, B = 35.5^\circ, C = 104.5^\circ$$

Part 5: Conic Sections

1. $x^2 + y^2 = 16$
2. $(x-2)^2 + (y-3)^2 = 25$
3. $(x-1)^2 + (y-1)^2 = 34$
4. center: (0, 0), radius = 4
5. center: (-3, 9), radius = 5
6. center: (-6, 7), radius = 7
7. center: (-1, 3), radius = 8
8. $(x+4)^2 + (y+3)^2 = 37$
9. $(x-2)^2 + (y+3)^2 = 9$
10. vertex: (0, 0), focus: (0, 1),
directrix: $y = -1$
11. vertex: (0, 0), focus: (2, 0),
directrix: $x = -2$
12. vertex: (2, -1), focus: (1, -1),
directrix: $x = 3$
13. vertex: (0, 2), focus: (-1, 2),
directrix: $x = 1$
14. vertex: (-3, -2), focus: (-3, -1),
directrix: $y = -3$
15. vertex: (-4, -2), focus: (-4, -1),
directrix: $x = -3$
16. $x = (y-1)^2$
17. $y = -1(x-1)^2 + 2$
18. $y = \frac{1}{4}x^2 - 1$
19. vertices: (5, 0) and (-5, 0), foci:
 $(\pm\sqrt{21}, 0)$
20. vertices: (3, 0) and (-3, 0), foci:
 $(\pm\sqrt{5}, 0)$
21. vertices: (0, 5) and (0, -5), foci:
 $(0, \pm 4)$
22. vertices: (0, 4) and (0, -4), foci:
 $(0, \pm\sqrt{15})$
23. center: (0, 0); transverse axis: horizontal,
length 10; vertices: (5, 0) and (-5, 0); foci:
 $(\pm\sqrt{34}, 0)$; asymptotes: $y = \pm\frac{3}{5}x$
24. center: (0, 0); transverse axis: horizontal,
length 1; vertices: (0.5, 0) and (-0.5, 0); foci:
 $\left(\pm\frac{\sqrt{5}}{2}, 0\right)$; asymptotes: $y = \pm 2x$
25. center: (0, 0); transverse axis: vertical,
length 6; vertices: (0, 3) and (0, -3); foci:
 $(0, \pm\sqrt{10})$; asymptotes: $y = \pm 3x$
26. center: (-3, 2); transverse axis: horizontal,
length 8; vertices: (5, 2) and (-8, 2); foci: (2,
2) and (-8, 2); asymptotes:
 $y - 2 = \pm\frac{3}{4}(x + 3)$